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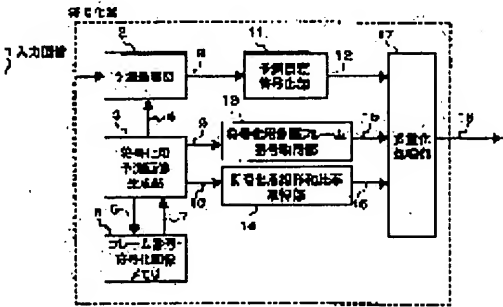
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(54) MOVING IMAGE CODING METHOD, DECODING METHOD, ENCODING DEVICE, DECODING  
DEVICE AND RECORDING MEDIUM STORING MOVING IMAGE CODING AND DECODING PROGRAM

(57)Abstract:

PROBLEM TO BE SOLVED: To generate a predictive image with high prediction efficiency in a moving image coding and decoding method.  
SOLUTION: A frame number/coding image memory 5 stores a coding reference image to which a reference number is given. A coding prediction image generating section 3 gives a plurality of reference frame numbers 6 to the memory 5 to obtain a plurality of corresponding reference image data 7 and mixes them at a proper ratio to be a linear sum to produce a predicted image 4. The predicted image 4 is outputted, and a selected reference frame number 9 and a ratio 10 for a linear sum are outputted respectively to a coding reference frame number acquisition section 13 and a coding linear sum ratio acquisition section 14. The reference frame number 9 and the ratio 10 for the linear sum are coded and outputted as a reference frame number 15 and a linear sum ratio data 16.



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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the video encoding method and decoding method which code video using inter frame prediction.

[0002]

[Description of the Prior Art]Prediction was performed by the linear combination of two or more good arbitrary pictures of predictive efficiency in this art that has Japanese Patent Application No. 9-18725 as a conventional method. For example, the 3rd frame of drawing 4 can be predicted by the picture mixed by the linear combination of the 1st frame and the 4th frame, and can be predicted by the picture which mixed the 6th frame by linear combination with the 4th and the 7th frame similarly. However, by the conventional method, the ratio of the linear combination of two or more pictures at the time of predicting is determined beforehand. This will be predicted that the ratio of linear combination becomes a:b, if it predicts that the ratio of linear combination becomes a:b using the 1st and the 4th frame about the 3rd frame and the 6th frame will use the 4th and the 7th frame similarly, since the ratio of linear combination is determined in an inter-frame distance etc.

[0003]Therefore, it often sees with an animation image etc. The video in which frame MIX processing which piles up two or more frame images and interpolates an intermediate frame is performed, Since the ratio of linear combination has become settled regardless of distance or a ratio changes variously, when predicting the video in which frame MIX processing is performed with the conventional prediction method, predictive efficiency will fall.

[0004]

[Problem(s) to be Solved by the Invention]Since the ratio of linear combination had become settled regardless of distance or the ratio of linear combination was changing variously, the video in which frame MIX processing is performed had a problem to which predictive efficiency falls in the conventional prediction method.

[0005]The purpose of this invention solves the above-mentioned problem, and there is in providing the good video encoding method, the video decoding method, coding equipment, and decoder of predictive efficiency rather than before.

[0006]

[Means for Solving the Problem]As opposed to a picture which gives a frame number to coded image data

and it is going to code after this in order that this invention may solve an aforementioned problem, A ratio for a frame number of a picture [ finishing / numerals ] and linear combination which predict using linear combination of a picture coded [ two or more / arbitrary ] and which were both used for prediction is also coded.

[0007]A video decoding method of this invention predicts by getting to know a ratio for a frame number of an image and linear combination which were used for prediction to an image which it is going to decode from now on.

[0008]A frame number and a coded image memory coding equipment of this invention has remembered a coded image comparison in which a reference frame number was given to be, A reference frame number is handed over in said frame number and coded image memory, Obtain said corresponding image comparison and the best estimated image of the prediction effect is generated from the inside, Or divide into portions of arbitrary sizes of the whole picture, and shape, determine image comparison data and a reference frame number for every portion of the, and an estimated image is generated, An estimated image creating means for coding which furthermore outputs a ratio for said reference frame number and linear combination, A ratio for said reference frame number and linear combination is coded, respectively, and it has a coding reference frame number acquisition means and a linear combination ratio acquisition means for coding which are outputted as reference frame number data and linear combination ratio data.

[0009]a decoder of this invention -- a frame number and a coded image memory in said coding equipment -- the same -- with a frame number and a coded image memory which has memorized an image comparison in which a reference frame number was given. A reference frame number acquisition means for decoding and a linear combination ratio acquisition means for decoding which output a ratio for a reference frame number and linear combination from said reference frame number data and linear combination ratio data, This reference frame number is handed over in said frame number and coded image memory, a corresponding image comparison is received, and it has an estimated image creating means for decoding which generates and outputs an estimated image like said estimated image creating means for coding.

[0010]By embedding a ratio for a frame number referred to at the time of inter frame prediction, and linear combination at coding data, even when a ratio for linear combination has become settled regardless of an inter-frame distance or it changes variously, it is possible to generate a good estimated image of predictive efficiency.

[0011]

[Embodiment of the Invention]Next, an embodiment of the invention is described with reference to drawings.

[0012]drawing 1 (1) and (2) -- each is a block diagram of the encoder and decoder of one embodiment of this invention.

[0013]Coding equipment comprises the forecast processing part 2, the estimated image generation part 3 for coding, a frame number and a coded image memory 5, the reference frame number acquisition part 13 for coding, the linear combination ratio acquisition part 14 for coding, the prediction error coding part 11, and the multiplex processing section 17.

[0014]The decoder comprises the separation sections 21, the prediction error decoding part 25, the reference frame number acquisition part 27 for decoding, the linear combination ratio acquisition part 28 for decoding, the estimated image addition processing section 31, the estimated image generation part 32 for decoding,

and a frame number and a coded image memory 34.

[0015] The reference frame number was given to the frame number and the coded image memory 5. The coded image comparison is memorized, a reference frame number is given to a frame number and the coded image memory 34, and the same image comparison as the image comparison memorized by the frame number and the coded image memory 5 is memorized.

[0016] Next, operation of this embodiment is explained with reference to drawing 2 (1) and (2).

[0017] The inputted image 1 is inputted into the forecast processing part 2 (Step 41), it is compared with the estimated image 4, and the prediction error image 8 is outputted. The estimated image generation part 3 for coding hands over two or more reference frame numbers 6 in a frame number and the coded image memory 5, and obtains two or more image comparison data 7 corresponding to it (Step 42). In the estimated image generation part 3 for coding, two or more image comparison data 7 is mixed to linear combination by a suitable ratio, and the estimated image 4 is generated (Step 43). At this time, it is also possible to restrict the frame number which memorizes the picture required for prediction to +one N+M by restricting the frame referred to as an estimated image to the range of a frame to [-N, +M] frame to be coded from now on. When this restriction does not exist, it is necessary to store all the pictures coded in the past.

[0018] With an interlace signal [ like the present television signal ] whose video is. When the picture of one frame consists of the picture of the 2 fields by jump operation, prediction of a field unit is also attained by using the identifier of not only a frame but the field, and giving a reference frame number per field.

[0019] For example, as drawing 3 shows, for prediction of the 3rd frame, the estimated image that the ratio of linear combination becomes a:b can be generated using the 1st and the 4th frame, and to it, an estimated image can be generated at the 6th-frame prediction using the 4th and the 7th frame so that the ratio of linear combination may become a':b'. Even when using for prediction two or more pictures which are in the same position relatively to the above coding subjects, it can mix by a different ratio.

[0020] Or in the estimated image generation part 3 for coding, the whole picture may be divided into the portions of arbitrary sizes and shape, and the ratio for two or more image comparison data used for prediction for every portion of the, reference frame numbers, and those linear combination may be determined. From the estimated image generation part 3 for coding, the ratio 10 for the selected reference frame number 9 and linear combination is outputted to the reference frame number acquisition part 13 for coding, and the linear combination ratio acquisition part 14 for coding besides the estimated image 4, respectively. The estimated image 4 is compared with 1 in an inputted image in the forecast processing part 2, and the prediction error image 8 is generated and it is outputted (Step 44). The reference frame number acquisition part 13 for coding and the linear combination ratio acquisition part 14 for coding code the ratio 10 for the reference frame number 9 and linear combination, respectively, and output it as the reference frame number data 15 and the linear combination ratio data 16 (Step 46). It is coded in the prediction error coding part 11, and the prediction error image 8 is outputted as the coding data 12 (Step 45). When there is no prediction error at this time, the coding data 12 is not outputted. The coding data 12, the reference frame number data 15, and the linear combination ratio data 16 are multiplexed in the multiplex processing section 17, and are outputted from coding equipment as the multiplexing coding data 18 (Step 49). Steps 43-46 are actually arranged in parallel, and are performed.

[0021] In a decoder, the inputted multiplexing coding data 18 is divided into the coding data 22, the reference

frame number data 23, and the linear combination ratio data 24 in the separation sections 21 (Steps 51 and 52). In the prediction error decoding part 25, the coding data 22 is decoded and is changed into the prediction error image 26 (Step 53). When the coding data 22 is not inputted at this time, the prediction error image 26 is not generated. The reference frame number data 23 and the linear combination ratio data 24 are inputted into the reference frame number acquisition part 27 for decoding, and the linear combination ratio acquisition part 28 for decoding, respectively, it is decoded respectively, and the ratio 30 for the reference frame number 29 and linear combination is outputted (Step 53). The ratio 30 for the reference frame number 29 and linear combination is inputted into the estimated image generation part 32 for decoding, specifies the reference frame number 35 to a frame number and the coded image memory 34 for every classification in an image, and receives the image comparison data 36. In the estimated image generation part 32 for decoding, the estimated image 33 is generated like the estimated image generation part 3 for coding, and it is outputted to the estimated image addition processing section 31 (Step 54). In the estimated image addition processing section 31, the estimated image 33 is added to the prediction error image 26, and the decoded image 37 is outputted (Step 55). When the prediction error image 26 is not generated, the estimated image 33 is outputted.

[0022] In the processing which does not send a prediction error from the first like frame interpolation, but interpolates an intermediate frame from the image frame of order, In this embodiment, there should be only the reference frame number acquisition part 13 for coding and the linear combination ratio acquisition part 14 for coding, the reference frame number acquisition part 27 for decoding, the linear combination ratio acquisition part 28 for decoding, the estimated image generation part 32 for decoding, and a frame number and a coded image memory 34. That is, the ratio for making them into linear combination is determined as two or more reference frame numbers for generating an interpolation picture; and the information is coded by the reference frame number acquisition part 13 for coding, and the linear combination ratio acquisition part 14 for coding. What is necessary is to generate an interpolation picture and just to output from the image comparison of a frame number and the coded image memory 34 in the estimated image generation part 32 for decoding, using the information.

[0023] Processing of coding equipment which was explained above is recorded on recording media, such as CD-ROM, FD, and semiconductor memory, and it may be made to perform it by a computer reading a video program from a recording medium as a video encoding program. Processing of a decoder is also the same.

[0024]

[Effect of the Invention] As explained above, this invention by embedding the ratio for the frame number referred to at the time of inter frame prediction, and linear combination at coding data, It is effective in a compression ratio [ in / even when the ratio for linear combination has become settled regardless of an inter-frame distance or it changes variously, it is possible to generate the good estimated image of predictive efficiency, and / as a result / coding ] improving.

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[Translation done.]